Pest Management Grants
Demonstration Final Report

February 28, 2002

Contract Number:	00-200S
Contract Title:	Integrated Apple Production (IAP) Demonstration Project
Principal Investigator:	Janet Caprile, Farm Advisor, Contra Costa County
Contractor Organization:	The Regents of the University of California Division of Agriculture and Natural Resources

Prepared for the Department of Pesticide Regulation

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ACKNOWLEDGEMENTS

This project would not have been possible without the invaluable contributions from the following individuals and organizations.

Field Scout: Dave Sanford, UC Cooperative Extension

Management Team: Rich Bakke, Consep, Inc (now Suterra)
Dewey DeMartini, Wilbur-Ellis Co.
Roland Gerber, Paramount Farming (Now Suterra)
Jack Jenkins, Pacific BioControl
Pat McKenzie, Wilbur-Ellis Co.

Growers:		
	Richard Chavez	Chavez-Garrels Orchard
	Mark Dwelley	Eden Plains Orchard
		Delta Orchard (Mating Disruption Comparison)
	Soupy Lopez	Lopez-Garrels Orchard
	Elgin Martin	Airdrome Orchards
	Ron Nunn	Jacuzzi Flats
		Rosie Flats
		Neroly Orchard
		Little Garrels Orchard

Advisory Team: Walt Bentley, Pest Specialist, UCCE - KAC
Scott Johnson, Apple Specialist, UCCE – KAC
Nick Mills, Assoc. Professor, Div. of Bio. Control - UCB
Bob Van Steenwyk, Pest Specialist, UCCE – UCB
Terry Prichard, Water Specialist, UCCE - UCD

Special thanks to Wilbur-Ellis Co. and Suterra for providing lunch at Management Team meetings.

This report was submitted in fulfillment of Agreement No. 00-200S "Integrated Apple Production (IAP) Demonstration Project" by the Regents of the University of California under the full sponsorship of the California Department of Pesticide Regulation. Work was completed as of February 28, 2002.

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EXECUTIVE SUMMARY

Agriculture-urban interface problems have led to an interest in adopting a reduced risk pest management program in Contra Costa County orchards. The use of pheromone mating disruption (MD) would allow apple growers to reduce the use of controversial materials, however, the cost and risk of these practices have been prohibitive. The IAP program was developed to help growers transition to a reduced risk system over the course of three years by providing a cost share for the pheromone products and monitoring assistance to help reduce the risk of failure. This is the final report of the three year transition.

Nine orchards (172.5 acres) participated in the IAP program 1999 and eight of these orchards continued in 2000 & 2001 (164 acres). Eleven orchards enrolled in the similar reduced risk BIFS program funded by UC SAREP in 2000 and 3 additional orchards enrolled 2001 (359 acres). The BIFS orchards adopted the IAP program's reduced risk practices and the two programs were run cooperatively sharing a Management Team, Project Coordinator, Field Scout, Advisory Team and certain growers who enrolled acreage in both programs. Progress was measured by comparing damage and pesticide use in the Reduced Risk (RR) program orchards to that of their last conventional year. In addition, three conventional orchards and one to three established mating disruption orchards were used each year as real time comparisons.

A flexible set of Reduced Risk Guidelines was developed for all the major apple pests to assist participating growers with their IPM decisions. These practices were updated and refined each year and have been incorporated into the current UC IPM Guidelines for Apples. By the third year of the IAP program, forty two percent of the apple orchards in the county had adopted the RR program approach. It is estimated that close to half the apple orchards in California are now using codling moth mating disruption but the actual pesticide use figures are not yet available.

The RR orchards have achieved their goal of reducing the use of targeted organophosphate and carbamate pesticides. In comparison with their last conventional year (1998), the IAP orchards reduced the use of these materials by 30% the first year, 58% the 2nd year and 18% the third year. The BIFS orchards showed a similar reduction of 65% the first year and 27% the second year. Since the beginning of the project the IAP and BIFS orchards have used an average of 41% less of the targeted materials than the conventional comparison orchards in the same years.

The costs for the RR pest management program have come down each year but they still average about 50-55% more than a traditional program. The IAP and BIFS cost share program offset this extra expense so that the grower's realized costs were from 18% less to 30% more than the conventional orchards in any given year. Next year the IAP orchards will not have a cost share program to offset actual costs. However, most IAP growers intend to continue with the RR program next year even with the increased cost.

Codling moth damage has gradually increased in program orchards each year and was higher than acceptable in 10 of the 21 program orchards during this final year. This can be attributed to the continued poor apple market (abandoned orchards, reduced inputs), high codling moth pressure and migration, trap indicator failures, and supplemental spray problems (insecticide resistance, timing, materials). The poor economic climate encouraged the trial of various cost cutting amendments to the RR program. A good deal has been learned about the effectiveness of such measures but the codling moth damage increased when the efforts were less than successful.

In summary, the IAP program has encouraged the adoption of reduced risk pest management practices in Contra Costa County and throughout the state and has reduced the use of targeted pesticides. However, the cost of this program is still more expensive and pest control less effective than a traditional program. It may be difficult for growers to adopt in light of the current economic constraints faced by the industry.

INTRODUCTION:

Rapid urbanization around apple orchards in Contra Costa County has lead to agricultural–urban interface problems with the use of pesticides being the primary concern. The primary goal of this project was to reduce the use of controversial, broad-spectrum insecticides in apple orchards by encouraging the use of proven, softer IPM practices. The specific objectives of this project included:

1. **Maintaining existing IAP orchards as demonstration sites**
   The project supported the original IAP orchards in their final year of transition to reduced risk practices. A Field Scout was hired to assist with monitoring and documentation of program practices. Business Agreements were prepared and cost share provided for the mating disruption product. These 8 demonstration orchards served as the templates for 13 new orchards which enrolled in the similar BIFS "Integrated Pome Fruit Production" program in 2000 & 2001. The reduced risk approach demonstrated in these orchards was extended to growers and PCAs throughout California in meetings, field days, and publications.

2. **Establishing an areawide approach to controlling codling moth using mating disruption**
   The key to a softer pest management approach in apples is to adopt a mating disruption program for codling moth, the principal apple pest. The other insect pests can be controlled by reduced risk approaches if the disruptive codling moth sprays are eliminated. However, Mating Disruption is more expensive and riskier than traditional methods and is best accomplished on larger acreages. The IAP program supported the adoption of Mating Disruption by offering a cost share for the product, monitoring assistance, and enrolling adjacent orchards to increase block size.

3. **Continue to develop effective reduced risk, IPM practices**
   A flexible set of reduced risk guidelines was developed and amended each year to include new materials and approaches. The IAP/BIFS management team met at regular intervals to review practices and provide a forum for exchange of alternative practices information.

4. **Document program impacts**
   A comparative monitoring program was developed to document program effectiveness. Pesticide use data and costs were collected from each participant.

RESULTS AND DISCUSSION:

The original objectives and bulleted tasks are listed below. Progress and accomplishments are addressed after the task list for each objective

Objective 1: Maintain the existing IAP demonstration orchards as long term demonstration sites

- *Project Coordinator has Business Agreements drawn up for each participating grower providing for a 50% cost share for the MD products used.*
  Business agreements were drawn up by the UC Business Office for each grower. The agreements specified the orchard, a maximum allocation for the mating disruption product based on the anticipated product and rate, as well as grower and program responsibilities. Growers purchased the MD product and submitted a bill for reimbursement (50% cost share) to the Project Coordinator at the end of the season.

- *Project Coordinator hires and trains a Field Scout to assist with comparative monitoring*
  A new, full time Field Scout was hired to assist with the monitoring and data entry for both the IAP and BIFS program. This was made possible by a funding increase from the BIFS program and successfully addressed the staffing problems of the previous season. The Field Scout checked and serviced traps on a weekly basis, assisted with the codling moth damage evaluation after each generation and before harvest, helped to evaluate other fruit damage and foliar pests throughout the summer, entered collected data in the computer, kept growers and PCAs informed about trap counts and damage, assisted with program meetings, and provided other program support as needed. The Project Coordinator also recruited and trained six Master Gardener volunteers to assist in the codling moth damage surveys. This allowed us to get through the IAP and BIFS orchards (648 acres) in a timely fashion so that supplemental controls could be initiated for the subsequent generation, if the survey indicated a need.

- *Project Coordinator organizes and publicizes a Winter IAP workshop for the Northern San Joaquin Valley with the assistance of the management team members.*
  The management team decided that a summer field day would be a better educational opportunity than a winter meeting. There had been a good deal of interest in the new Paramount Aerosol Dispensers and as we had several orchards using this dispenser, it was felt that this would be a good opportunity for growers and PCAs to see this new product in action. We held a 3 hour Field Day titled "Mating Disruption: Making it Work" on August 15th in the Preston Orchard in Brentwood. Management Team members made presentations on using mating disruption, monitoring and current products. Invited guests made presentations on new and future products. Participants had the opportunity to interact with the product representatives and compare the various products. The meeting was advertised throughout the No. San Joaquin Valley via Farm Advisor newsletters. We had 20 attendees; half of these were PCAs who came from outside Contra Costa Co. and provide service to the Northern San Joaquin Valley and beyond. The meeting agenda is included in the appendix.

- *Prepare a Progress Report and a Final Report*
  Progress report was prepared and submitted September 28, 2001
  Final Report was prepared and submitted February 28, 2002

- *Project Coordinator prepares outreach presentations and materials*
  Presentations (not including regular Management Team/Grower meetings) and publications completed this season are outlined below. All outreach efforts conducted over the 3 year project history are included in Table 9 in the appendix.

Presentations:

Integrated Apple Production Projects in Contra Costa County
February 27, 2001, Stockton
Invited presentation at the Mid Valley Apple Growers annual Apple Symposium Meeting. 84 attendees.

Mating Disruption
March 7, 2001, Watsonville
Invited presentation at the 6th annual "Moth Madness" apple growers meeting. 29 attendees.

Integrated Apple Production Projects in Contra Costa County
April 4, 2001, Placerville
Invited presentation at the El Dorado & Amador County Grower's Meeting. 25 attendees.

Organic Apple & Pear Production Practices in California
July 27, 2001, Sacramento
Invited presentation at the annual American Society of Horticultural Science conference.
60+ scientists attended.

Mating Disruption: Making it Work
August 15, 2001, Brentwood
Annual IAP/BIFS Field Day
20 growers & PCAs attended

Organic Apple & Pear Production in California
November 7, 2001, UC Davis
Invited presentation at UC Organic Farming Workgroup Meeting
60+ faculty, farm advisors, and other researchers in attendance

Codling Moth Management Update
December 8 & 20, 2001, Brentwood
Annual private applicator pest management update
97 growers and PCAs attended

Codling Moth Mating Disruption in Apples
January 22, 2002, Merced
Invited presentation at Merced Junior College Pest Management Update Meeting
120 PCAs, PCOs or Private Applicators attended

New Developments in Reduced Risk Apple Production
March 14, 2002, Watsonville
Invited presentation at the annual Central Coast apple growers meeting

Publications:

Caprile, J., L. Varela, C.Pickel, W.Coates, W. Bentley, P. Vossen, *UC IPM Pest Management Guidelines: Apples.* Revised Winter 2002 (to include more reduced risk options).

Caprile, Janet. *Program gives softer pest control: Integrated Pome Fruit production Programs ease ag-urban concerns.* Tree Fruit Magazine, July/August 2001, pp.9,13.

Objective 2: Establish an area-wide approach to codling moth control using Mating Disruption

- *Integrate IAP & BIFS programs*
  The Project Coordinator, Management Team, Field Scout, Advisory Team and IPM Guidelines were shared for both the IAP & BIFS projects. Reports will include the data from both projects. The projects are not identical but complementary and the sharing of staff and information enhances both projects. In response to last season's difficulty in finding reliable staff, the BIFS program increased funding for 2001 in order to provide for a full time Field Scout for both projects. A map of area apple orchards including program orchards is included in Figure 1. A comprehensive list of program orchards and their mating disruption choices are included in Table1.

- *Publicize program to local growers and PCAs*
  The IAP and BIFS programs were presented to local growers at the annual Contra Costa County Pest Management Continuing Education Meetings in December of 2001 in Brentwood. Ninety seven local growers and PCAs attended.

- *Select additional reduced risk sites to include in IAP/BIFS programs*

Three additional orchards (111 acres) were added to the IAP/BIFS program in 2001. These orchards were adjacent to existing program orchards, thereby expanding the size of the treated block, increasing the potential for success and reducing the cost for each orchard. The expansion was made possible due to acreage reduction in three orchards and conversion of other orchards to the less expensive Paramount Aerosol Dispensers.

- *Develop and conduct a CM monitoring scheme and a rapid communication method*
  Arrangements were made with each participating grower and PCA at the beginning of the season with regard to trap numbers, placement, schedules, and data transfer to assure that they could make the most use from the monitoring data. Traps were put out at a rate of one trap for every 3.6 acres with about ¼ of these traps using high load lures to track flights and ¾ of them using low load lures to detect problems with control. It took 2 full days each week for the Field Scout to check and service the traps. Trap counts were faxed or dropped off to growers/ PCAs within 1 day of data collection. Any apparent problems were noted at that time. Trap counts are included in Tables 4A and 4B.

  Codling moth surveys were done at the end of the first and second generation and just before harvest. The Project Coordinator, the Field Scout, and six trained volunteers conducted the surveys. One thousand to 2000 fruit were examined per orchard and damaged fruit cut open to determine the timing of the damage to assist with management decisions for the next generation. The codling moth damage counts are included in Table 5. After each survey, a map showing the location of the damage and the trap counts in each orchard was prepared to help project personnel, growers and PCAs get a better idea of how trap data translates into damage. A comprehensive summary of codling moth control practices, damage, and analysis is included in Tables 6A-E.

  IAP Orchards: Four of the IAP orchards used Isomate, three orchards switched to the Paramount Aerosol Dispensers and one orchard switched to Checkmate dispensers. Those orchards with greater than 1% damage last season applied supplemental sprays for the first flight to reduce the overwintering population. Codling moth damage in the eight IAP orchards ranged from 0.3 to 20% and averaged 9.6% damage. This is higher than the average damage in the first year (1%) or the second year (3.2%). Only two of the eight orchards (Neroly, Rosie Flats) had acceptable control this year. Specific orchard details are noted below.

  - Four orchards (Rosie Flats, Jacuzzi Flats, Airdrome apples, Eden Plains) had continued pressure from adjacent high population blocks. The Airdrome apple orchard did not re-apply the Isomate mid season as the high trap counts from the adjacent orchard indicated sprays would be necessary for the remainder of the season; the grower opted to simply apply the sprays without the expense of the mating disruption until the population could be brought under control. The other three orchards did re-apply the Isomate for the later half of the season and used supplemental full cover or perimeter sprays to control the off-site migration. This approach worked well in the Rosie Flats orchard (with less pressure) but the Jacuzzi Flats and Eden Plains orchards sustained unacceptably high damage by the 3rd generation as supplemental sprays were not applied for both the A and B flights of each generation.

  - The three IAP orchards using the Paramount Aerosol Dispensers (Little Garrells, Lopez Garrells, Chavez Garrells) applied them at the beginning of the 1B flight as the 1A flight was to be sprayed. The late hanging was intended to allow the dispenser to be programmed to apply a little more pheromone during the remainder of the season. However, all three orchards had continued problems with on site populations due to the ineffectiveness of the first generation sprays. This was due to using less effective materials, slightly late application, and poor spray performance (indicating insecticide resistance).

- The Neroly orchard maintained low pressure and damage last season and this season. However, in response to a poor market outlook, the grower opted to apply a more economical 3rd generation spray rather than re-apply the Isomate for the last half of the season. This approach worked well as the first Isomate application suppressed the low codling moth population through the second generation and only a single spray was required for the 3rd generation before harvest.

BIFS Orchards: The BIFS orchards had CM damage that ranged from 0.1 to 35% averaging 9.1% damage. This is higher than last year's 7.3% damage (ranging from 0-54%) They employed 3 different MD products -- Isomate, Checkmate, and Paramount Aerosol Dispensers. All the BIFS orchards applied a first generation cover spray to reduce populations. Additional sprays were applied in response to pest pressure.

- The Geddes orchard was in the same block as the three IAP Garrells orchards noted above and used the Paramount dispensers similarly. This orchard also had a similar problem with the first generation sprays, which resulted in poor codling moth control throughout the season.

- The two Preston orchards continued with the Paramount Aerosol Dispensers and expanded the MD program into the adjacent Preston 3 block. These were all low pressure blocks that performed fairly well with a minimum of supplemental sprays. However, by the third generation, the population from an adjacent upwind block had moved into the edge of the Preston 1 & 2 block increasing the average damage count in those orchards to 2.5-3%. These orchards will require a well-applied first generation spray next season to reduce the overwintering generation.

- The Kami-Grigsby-Ghiozzi block was expanded to include two adjacent blocks and all five orchards used the Paramount dispensers. All five orchards had sustained CM damage last season and required supplemental sprays for each generation. As with the Geddes/Garrels block, there was a problem with effectiveness of some of the supplemental sprays. This can be attributed to using less effective materials (Sevin), timing, trap performance, and possible spray resistance. All of these blocks had unacceptable damage ranging from 5.5 to 25% damage and will need an aggressive spray program next season to reduce this pressure.

- The Stonebarger orchard continued with Isomate. It was fairly isolated from other problem blocks and was able to maintain low pressure and damage with minimal sprays and a single hang.

- The Airdrome pear and apple (IAP) blocks used Checkmate dispensers. These blocks had fairly high pressure from last season due to a build up in the pears after harvest that moved in to damage the late harvest apples. This season the MD was applied according to the approach commonly used in pears - the product was applied just before the first generation spray, about 3 weeks after biofix in order to assure that the product lasted through the 2nd generation and pear harvest. However, we had very high trap counts in the apples and adjacent Bartlett pears for the 2nd generation. No supplemental spray was applied as the Bartletts were being harvested just as the hatch was beginning - they sustained 2.7% damage. The Bosc sustained very little damage (0.1%) as they were farther away from the population center (the apples) and are less susceptible to damage. The MD was not reapplied in the apples as the population was deemed too high and each flight would need to be sprayed.

- Frog Hollow was the organic block that sustained very high damage (54%) last season. This season they used a high rate of Isomate and took an extremely aggressive supplemental approach.

Oil was applied on a 7-10 day schedule during the high flight periods of each generation. Any damaged fruit was thinned out towards the later portion of each the generation and removed from the orchard. The damage at the end of the season was 10%. These are very positive results given the difficulty of reducing populations with organic options. We also conducted trials with a new granulosis virus product in this orchard that did not prove to be as effective as oil.

The IAP and BIFS orchards have been seriously affected by the poor market outlook and resultant budgetary restraints. Several orchards had increasing problems with migration of codling moth into program orchards from adjacent blocks that were minimally managed due to economic constraints. These same constraints limited the number of supplemental sprays applied to control problem spots and led to the selection of materials which were cheaper but not as effective. In addition, our indictor traps failed detect problem spots in some orchards and some well timed insecticide sprays failed to provide control indicating a resistance problem.

Objectives 3: Continue to develop a Reduced Risk IPM program

- *Amend the 2000 IPM plan*
  The reduced risk (RR) IPM guidelines from 2000 were reviewed by the Project Coordinator and Management Team Members at the beginning of the season. The guidelines were adjusted and amended to meet current conditions, materials and experiences. They are intended to be a flexible set of options outlining RR alternatives for the various pests that growers were likely to encounter. The Guidelines are included in Table 2.

- *Management team meets at regular intervals throughout the season*
  Table 3 includes a list of the Management Team members, participating growers and invited guests as well as a summary of the meeting dates, agendas, and attendance. The Management Team for the IAP and BIFS programs were combined in 2000 and the membership adjusted to include primarily pest management professionals. This change was done at the request of participating growers who felt these professionals were better suited to direct the program. The Management Team met at the beginning of the season and after each codling moth survey to go over results. All participating growers and other PCAs who expressed interest were invited to attend. We typically had between 9 and 17 attendees. Four meetings were conducted over lunch (hosted by Wilbur-Ellis or Suterra). A fifth meeting was held in the field and all apple growers/PCAs in the Northern San Joaquin Valley were invited.

Objective 4: Document program impacts.

- *Develop a comparative monitoring program for key pests*
  A monitoring program was established for key apple and pear pests in consultation with Advisory Team members and the UC IPM Guidelines. The Project Coordinator and Field Scout visited the orchards to evaluate the incidence and severity of secondary foliar and fruit pests and the occurrence of beneficials. A summary is included in Table 7 & 8. Secondary foliar pests were more apparent in orchards that had applied multiple supplemental sprays. There was a significant incidence of foliar and fruit scab in many orchards since preventative sprays had been minimized as a cost saving effort. There was a low incidence of leafroller, thrip, true bug, San Jose scale and blister mite damage in fruit at our mid-season evaluation. Some of the orchards which had mild blister mite in mid June had more significant damage from this pest which was observed during our pre-harvest sample. A second, formal evaluation was not made as this pest is rarely found in apples and the increased damage was unexpected. Conversation with other growers in the San Joaquin Valley revealed that many growers saw this damage for the first time this season. Bob Van Steenwyk, UCCE Entomology Specialist (and

IAP/BIFS Advisory Committee member) was contacted for identification verification and control options for this pest.

- *Collect pesticide use information and costs from participating growers*
The total amount insect and disease management materials applied this season went down in the IAP as well as the Mating Disruption and conventional comparison orchards and went up slightly in the BIFS orchards (Figure 2). This reduction is reflective of the economic crisis facing the apple industry rather than a reduction in pest pressure or treatment need. This is apparent from the increase in codling moth and other pest damage in both the IAP/BIFS/MD and conventional orchards this season. The pesticide use in the IAP orchards was reduced 70% over last year and 42% over their last conventional year. The pesticide use in the BIFS orchards was increased 7% over last year and decreased 27% over their last conventional year. The pesticide use in the MD comparison orchard was reduced 80% over last year (including the 2 transitional organic orchards) and was about the same as the first year in MD. The conventional orchards reduced their pesticide use by about 60% over the previous 2 seasons. Additionally, a high percentage of the total insect and pest management materials were reduced risk alternatives. The RR materials comprised 50% of the IAP use, 88% of the BIFS use, 61% of the MD comparison use and 44 % of the conventional comparison use.

Although the total amount of pesticides were generally reduced this season, the use of targeted materials generally increased (Figure 2) in all orchards in comparison with last year. This is due to the increase in codling moth pressure, OP sprays and resultant sprays for secondary pests. The increase in carbamate use was due entirely to efforts to reduce costs by using an inexpensive chemical thinner (rather hand thinning) which also could double as a codling moth control material. This cost cutting measure did not provide good codling moth control and resulted instead in additional sprays for subsequent generations. The use of targeted materials was consistently lower in the Reduced Risk (IAP/BIFS/MD) orchards than the conventional orchards for all years. This season, they were 38% lower in the IAP orchards, 33% lower in the BIFS orchards, and 46% lower in the MD comparison orchard.

The full cost of the IAP program in the third (and final) year was $75/A less than last year and $121/A (60%) higher than this year's conventional comparison orchards. The average cost share for the IAP orchards is $101/A and brings the actual grower cost down to $219/A which is only $20 more than this year's conventional orchard costs. The full cost of the BIFS program was $357/A, which was 4% higher than last year and $158/A (79%) higher than this year's conventional comparison orchards. The average cost share for the BIFS orchards is $95/A and brings the actual grower cost down to $262/A which is still $63 more than this year's conventional orchard costs. The cost for the Mating Disruption Comparison orchard in the fourth year was $358/A, which was $37/A less than last year's orchards (which included 2 orchards transitioning to organic). The costs were quite similar to this year's BIFS orchards.

The costs outlined above do not include the cost of application OR the cost associated with damaged crop. Crop loss estimates can very greatly as they depend on orchard yields, fruit size, the percent packed for fresh market, the price received for the various size categories over the course of the season, and harvest/packing costs. However, if we assume an average yield of 25T/A, a 66% packout, an average price of $10/box, and standard harvest and packing costs, then 1% fruit damage represents a loss of $55-75/A. These calculations are based on the "2001 Sample Costs to Establish an Apple Orchard and Produce Apples" published by UC Cooperative Extension and available on the UCD Agricultural Economics Department website at http://coststudies.ucdavis.edu.

SUMMARY AND CONCLUSIONS

This was the final year of a 3 year project designed to help growers adopt RR pest management practices and reduce the use of targeted OP and carbamate pesticides. Nine orchards began the IAP program in 1999 and eight orchards continued through the third year. These original orchards and their RR program served as a template for the similar, 3 year BIFS program which began in 2000. These programs were run cooperatively and a total of 21 orchards (523 acres) were enrolled in one of the two RR programs by 2001. Additional orchards adopted the program without enrolling as cost share funds were limited. However, we did assist with monitoring and decision support for many of those orchards. A total of 652 acres were monitored last season (2001) and 42% of the apple acreage in the county was employing these RR programs.

A flexible set of Reduced Risk Guidelines for all the major apple pests was developed to assist participating growers with their IPM decisions. These practices were updated and refined each year and have been widely distributed to other growers and pest management professionals throughout the state. Over the course of this three year project, 19 presentations have reached over 2990 growers, pest management professional and researchers throughout the state and beyond. In addition, articles were published in 3 trade magazines with statewide circulation and the UC IPM guidelines have been updated to include these practices. It is estimated that about 50% of the apples in California have adopted the mating disruption approach although the Pesticide Use Reports are not yet available from this last season to verify this estimate.

Codling moth (CM) was the primary pest in all orchards and damage tended to increase over the three year project. CM damage in the IAP orchards averaged 1.0%, 3.1% and 9.6% in 1999, 2000, and 2001 respectively. The BIFS orchards averaged 7.3% and 10.6% in 2000 and 2001, respectively. The damage was higher than acceptable in 10 of the 21 program orchards and can be attributed primarily to the poor apple market. This has led to abandoned or minimally managed orchards which have increased codling moth pressure and migration into program orchards. Growers have needed to reduce inputs and have sometimes chosen cheaper but less effective materials or have not been able to apply preventative or supplemental sprays in response to the migration. Limited resources encouraged the trial of various cost cutting amendments to the RR program. A good deal has been learned about the effectiveness of such measures but the codling moth damage increased when the efforts were less than successful. There were also problems related to poor indicator trap performance and poor spray performance. These will be addressed in continuing orchards next year with new lures/trap placement, attention to maximizing spray efficiency, and insecticide resistance testing. Those orchards that experienced unacceptable damage last season will require an aggressive (and expensive) program to bring the population back under control. The apple market will influence how aggressive and successful a program can be undertaken.

There was additional pressure from secondary pests (scale, mite, leaf miner) this last season in some orchards due to an increase in broad-spectrum sprays to control codling moth. Additional sprays went on to control these pests, averting damage in most cases. Some orchards also had disease problems due to the lack of an effective predictive model and efforts to reduce inputs and the number of preventative sprays.

This season showed a declining trend in the application of insect and disease management materials in most orchards in comparison with last season. This trend reflects the continued poor apple market rather than a decrease in pest problems. The IAP orchards showed a 70% decrease in these materials, while the BIFS orchards had a slight (7%) increase, the MD comparison orchards showed a 80% decrease and the conventional comparison orchards showed a 67% decrease in the use of these materials.

Although there was a trend for the total amount of pesticides to decrease, the percent of targeted materials actually increased this year in response to the increased pest pressure and the increased use of chemical thinning agents. Again, this is a result of the continued poor apple market. However, in comparison with this year's conventional orchards, the targeted materials were 38% lower in the IAP orchards, 33% lower in the BIFS orchards, and 46% lower in the Mating Disruption (MD) comparison orchard. And over the course of the 3 year project, targeted materials have been reduced by 41% in program orchards.

The costs for the RR program have continued to decline but are still not comparable to a conventional program. The real world cost for the RR programs have varied in response to pest pressure but have averaged about 50-55% more than the conventional program over the last 3 years. The cost share has brought the growers realized cost down to a more reasonable level from 18% less to 30% more for any given year. The continued codling moth pressure has limited the ability to reduce costs as low as anticipated at the beginning of the project. Next year only the BIFS growers will receive a cost share. However, most of the IAP growers intend to continue with the program in spite of the additional cost.

In short, the IAP program has developed a model reduced risk IPM program that has been widely adopted throughout the county and state. Target pesticide use has been reduced significantly. The benefits have not yet been fully realized or the program fully implemented due to the economic constraints of the poor apple market.

Figure 1: Apple orchards in Contra Costa County.

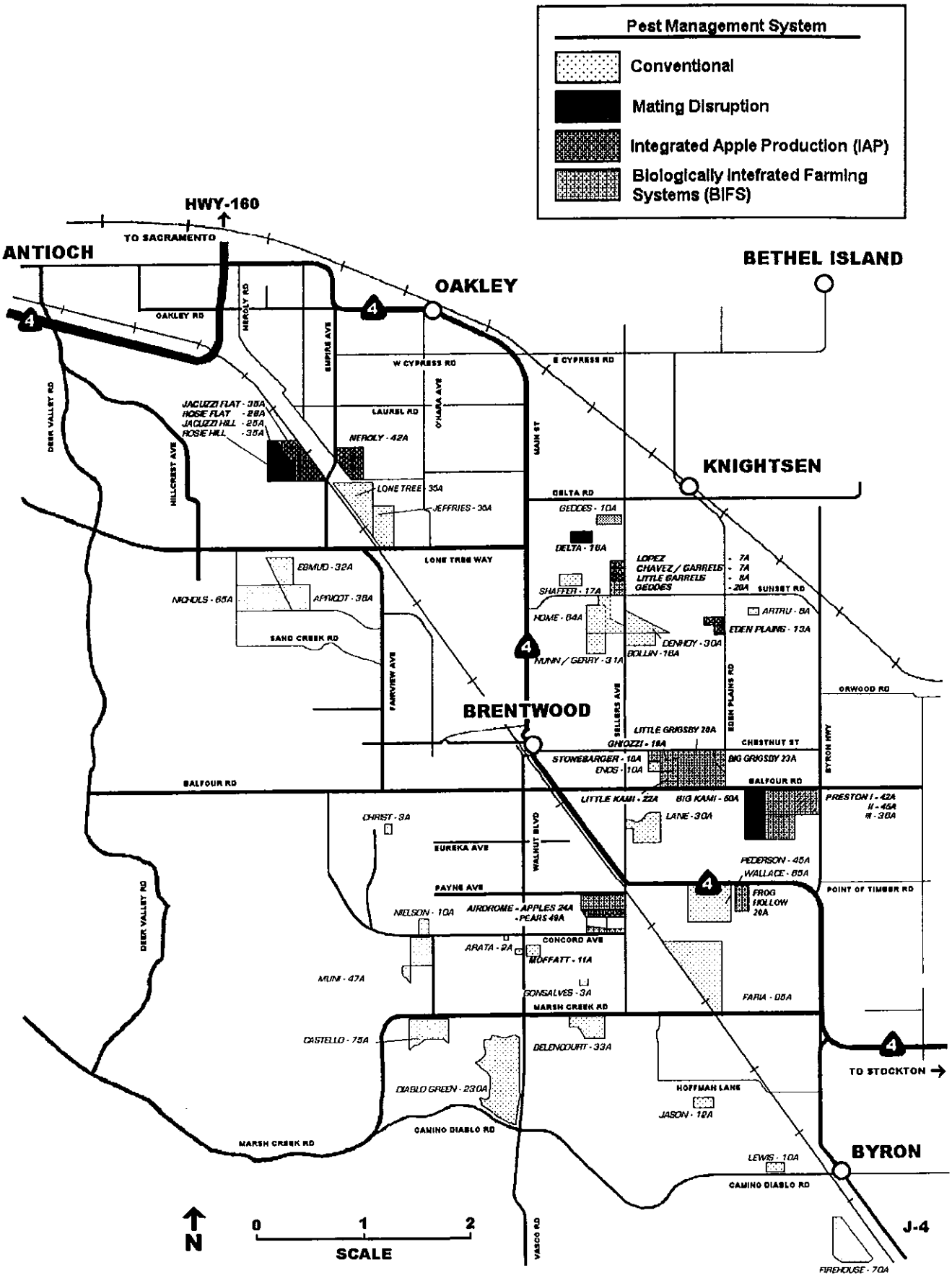

Table 1: Orchards participating in the IAPand BIFS programs and comparisons

IAP Orchards - Year 3					
BLOCK	ORCHARD	ACRES	PRIMARY CM CONTROL	YEAR IN PROGRAM	PROGRAM CODE
5	Jacuzzi Flat	35	1.5 Isomate applications	3	IAP 3
5	Rosie Flat	28	1.5 Isomate applications	3	IAP 3
5	Neroly	42	1 Isomate application	3	IAP 3
6	Eden Plains	13	2 Isomate applications	3	IAP 3
3	*Lopez Garrels*	7	*1 Paramount application*	3	IAP 3
3	Chavez Garrels	7	1 Paramount application	3	IAP 3
3	Little Garrels	8	1 Paramount application	3	IAP 3
4	Airdrome: apples	24	2 Checkmate applications	3	IAP 3
	SUBTOTAL	164			
BIFS Orchards - Year 1 and Year 2					
	ORCHARD	ACRES	PRIMARY CM CONTROL	YEAR IN PROGRAM	PROGRAM CODE
3	Geddes	20	1 Paramount application	2	BIFS 2
2	Little Kami	22	1 Paramount application	2	BIFS 2
2	Big Kami	50	1 Paramount application	1	BIFS 1
2	Little Grigsby	22	1 Paramount application	2	BIFS 2
2	Big Grigsby	23	1 Paramount application	1	BIFS 1
2	Ghiozzi	20	1 Paramount application	2	BIFS 2
2	Stonebarger	10	1 Isomate application	2	BIFS 2
1	Preston I	42	1 Paramount application	2	BIFS 2
1	Preston II	45	1 Paramount application	2	BIFS 2
1	Preston III	38	1 Paramount application	1	BIFS 1
4	Airdrome: Bartletts	20	1 Checkmate application	2	BIFS 2
4	Airdrome: Bosc	27	1 Checkmate application	2	BIFS 2
7	Frog Hollow	20	2 Isomate applications	2	BIFS 2
	SUBTOTAL	359			
Mating Disruption Comparison Orchard - Year 4					
	ORCHARD	ACRES	PRIMARY CM CONTROL	YEAR IN PROGRAM	PROGRAM CODE
	Delta Rd	16	1.5 Isomate applications	4	MD 4
Conventional Comparison Orchards - CONV					
	ORCHARD	ACRES	PRIMARY CM CONTROL	YEAR IN PROGRAM	PROGRAM CODE
	No. 28	31	3-6 Organophosphate (OP) Sprays	1	CONV
	Muni	47	3-6 Organophosphate (OP) Sprays	1	CONV
	Lone Tree	35	3-6 Organophosphate (OP) Sprays	1	CONV
	SUBTOTAL	113			
	TOTAL ACRES	652			

Table 2: Reduced Risk (RR) IPM Guidelines

Pest/Problem	Control Strategy
Codling Moth	Mating Disruption with supplemental sprays, as needed Supplemetal OP sprays: Imidan, Guthion Supplemental RR controls: Confirm, Success, Surround, Oil 1st year: full rate MD 1st generation OP spray 2nd & 3rd generation: full or edge or no spray - based on monitoring OP or RR material - based on monitoring 2nd year: full to slightly reduced rate of MD - depending on pressure 1st generation: full or edge or no spray - based on monitoring OP or RR - based on monitoring 2nd & 3rd generation: full or edge or no spray - based on monitoring OP or RR material - based on monitoring 3rd year: full to reduced rate of MD - depending on pressure 1st generation: full or edge or no spray - based on monitoring OP or RR - based on monitoring 2nd & 3rd generation: full or edge or no spray - based on monitoring OP or RR material - based on monitoring Mastrus releases in fall once broad spectrum materials have been minimized
Pear Psylla	dormant oil in season oil, Provado, Agrimek
Leaf Rollers	BT, Confirm, or Success if monitoring indicates a problem
Leaf Miner	preventative Agrimek spray with 1st CM OP spray naturally occuring beneficials will control once broad spectrum materials are minimized
Mites	preventative Agrimek, Apollo spray with OP sprays oil for in season populations if monitoring for pests & beneficials indicates a problem naturally occuring beneficials may control once broad spectrum materials are minimized
Aphid	Provado, oil, soap if monitoring for pests & beneficials indicates a problem
Leaf Hopper	Provado if monitoring indicates a problem (there are some egg parasites but little is known about the beneficials which control LH)
Scale	dormant oil

Table 3: Management Team/Grower Meetings and Field Days

DATE	AGENDA	PARTICIPANTS	
March	2000 Season Year End Meeting	Nick Macris	Alan Cheney
8	Introductions	Curtis Filler	Dewey DeMartini
	Final Reports	Jack Jenkins	Rich Bakke
	Overall Damage, Costs, Pesticide Use	Dave Sanford	Manuel Javares
	Orchard by Orchard Review of Pest-	Elgin Martin	Richard Chavez
	Management Program and Damage	Jim Colyn	Nasario Lopez
	Strategies for Next Season	Tony Ghiozzi	Al Courchesne
	Suggestions for Program Improvements	Pat McKenzie	Phillip Kirsch
	or Changes	John Arnold	Janet Caprile
	Other Business	Roland Gerber	
July	Management Team and Grower Meeting	Jack Jenkins	Bev Ransom
5	Review 1st Generation Codling Moth Damage	Dave Sanford	Dewey DeMartini
	Round Table Discussion	Tony Ghiozzi	Rich Bakke
	Decide on Tiime/Place of a Field Day	Nasario Lopez	Roland Gerber
	Set Next Meeting Date	Marco Barzman	Janet Caprile
August	Management Team and Grower Meeting	Roland Gerber	Bev Ransom
9	Review 2nd Generation Codling Moth Damage	Steven Hartmeier	Dave Sanford
	Round Table Discussion	Jas Singh	Bob Hobza
	Discuss Mating Disruption Field Day Details	Tom Larsen	Janet Caprile
	Set Next Meeting Date - After Harvest	Rich Bakke	
August	Mating Disruption Field Day	Ed Meyer	Bob Hobza
15	Mating Disruption Overview	Sean Swezey	Jon Christ
	Monitoring Techniques	Richard Chavez	Antonio Solari
	Available Products	Matthew Hemly	Roland Gerber
	New and Future Products	Rich Bakke	Mitchell King
	Visit Info. Tables, Talk to Reps, PCAs, etc.	William Thomas	Karl Yuki
		Matthew Needham	Ben Goudie
		Jack Jenkins	Pat Gentry
		Dave Sanford	Janet Caprile
		Don Thompson	Tony Ghiozzi
November	2001 Season Year End Meeting	Rich Bakke	
20	Round Table Discussion	Jack Jenkins	
	Review Season's Problems/Solutions	Janet Caprile	
	1. Codling Moth	Dave Sanford	
	2. Scab	Pat McKenzie	
	3. Fertility - N & Zn	Dewey DeMartini	
	4. Blister Mite - new apple pest	Bev Ransom	
	5. Communication & Suggestions		

Table 4A: Tuesday trap counts throughout the 2001 season

Progra	Ranch	Trap No.	Lure	3/21	3/22	3/23	3/27	4/3	4/4	4/10	4/17	4/24	5/1	5/8	5/15	5/22	5/29	6/5	6/11	6/19	6/26	7/3	7/10	7/16	7/23	7/31	8/7	8/13	8/21	8/27	9/4	9/11	9/18	CUM BF1	CUM BF2	CUM BF3	SEASON TOTAL
REGULAR 1X LURES:																																					
BIFS	Little Kami	1	L2	UP			1	81		11	78	83	76	2	44	15	2	79	7	30	30	8	7	0	0	0	0	5	13	24	9	0	0	393	161	51	605
		2	L2	UP			2	78		20	70	48	59	51	14	5	2	39	22	11	5	9	2	0	0	0	0	28	8	7	4	0	0	349	88	47	484
		8	L2	UP			14	90		3	64	94	70	75	2	11	1	67	17	7	5	7	12	1	0	3	2	12	9	7	11	0	0	424	116	44	584
BIFS	Ghiozzi	6	L2	UP			4	57		18	37	25	36	31	0	0	0	1	1	0	0	0	0	0	0	0	0	3	1	0	3	0	0	208	2	7	217
		10	L2	UP			2	77		19	46	74	77	63	2	0	0	12	1	5	6	3	8	0	0	0	0	7	3	3	3	0	0	360	35	16	411
		14	L2	UP			2	0		24	53	26	31	42	0	0	0	1	1	2	0	0	0	0	0	0	0	2	0	0	0	0	0	178	4	2	184
BIFS	Little Grigsby	9	L2	UP			3	31		12	49	13	14	11	3	0	0	18	0	1	0	0	1	0	0	0	0	8	2	5	4	0	0	136	20	19	175
		11	L2	UP			1	24		3	32	43	31	13	1	1	0	23	1	8	4	2	4	1	0	1	0	7	1	2	3	0	0	149	43	14	206
		12	L2	UP			1	48		8	58	18	32	40	4	3	2	14	7	5	3	0	5	2	1	0	0	8	3	8	11	1	0	214	37	31	282
BIFS	*Stonebarger*	4	L2	UP			0	0		0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	1	0	2	0	4	6
		15	L2	UP			TD	TD		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	8	2	0	0	2	11	13
BIFS	Big Kami	16	L2									UP	67	86	43	4	0	0	0	0	0	0	1	1	0	1	0	1	1	0	0	0	0	200	2	3	205
		17	L2									UP	43	NR	60	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	103	3	0	106
		19	L2									UP	25	32	2	0	0	0	0	0	0	0	7	0	0	0	0	0	1	0	0	0	0	59	7	1	67
		20	L2									UP	15	20	1	0	0	0	0	0	0	0	9	1	5	0	2	1	0	0	0	0	0	36	15	3	54
		21	L2									UP	13	36	14	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	65	1	1	67
		23	L2									*UP*	51	76	18	3	*0*	*0*	*0*	*0*	*0*	*0*	6	6	1	*0*	*0*	2	*0*	1	*0*	0	0	150	13	3	166
		24	L2									UP	78	64	13	0	0	1	0	0	0	0	5	1	1	0	0	0	1	1	0	0	0	155	8	2	165
		25	L2									UP	47	55	20	1	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0	123	3	1	127
BIFS	Big Grigsby	26	L2									UP	46	NR	87	10	4	3	0	1	1	0	18	10	3	1	1	NR	0	0	0	0	0	147	36	2	185
		27	L2									UP	34	44	30	0	0	2	0	NR	2	0	6	2	1	0	0	NR	0	0	0	0	0	108	13	0	121
		28	L2									UP	28	9	41	12	1	0	0	NR	0	0	12	7	3	5	3	NR	0	0	0	0	0	91	22	8	121
		30	L2									UP	44	TD	16	0	0	0	0	0	0	0	13	6	0	1	2	NR	0	0	0	0	0	80	19	3	82
BIFS	Preston III	17	L2									UP	4	2	3	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	9	3	0	12
		19	L2									UP	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	8
		20	L2									UP	2	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	8
		21	L2									UP	1	2	2	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	5	1	1	7
		22	L2									NU	NU	UP	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1
		23	L2									UP	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	1	0	3
BIFS	*Preston II*	1	L2		UP		0		14	2	4	2	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	2	0	0	0	24	1	4	29
		3	L2			UP	0		12	1	7	3	3	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	28	1	2	31
		5	L2			UP	0		20	0	14	4	6	8	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	52	0	1	53
		6	L2			UP	2		17	3	12	0	5	7	1	0	0	0	0	0	1	2	9	0	0	4	0	10	2	1	2	0	0	47	12	19	78
		7	L2			UP	2		15	2	6	3	3	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0	0	35	1	3	39
		8	L2		UP		1		44	7	34	18	6	5	3	0	0	0	0	1	2	0	0	0	0	0	0	1	0	1	0	0	0	118	3	2	123
BIFS	Preston I	9	L2			UP	1		17	5	5	3	10	11	2	0	0	0	0	1	0	0	0	0	0	0	0	0	2	1	0	0	0	54	1	3	58
		10	L2		UP		0		24	5	4	2	5	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0	0	46
		11	L2			UP	0		15	2	2	2	0	4	2	1	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	26	3	0	31
		12	L2			UP	1		42	5	9	1	8	10	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	77	2	0	79
		14	L2		UP		4		31	4	7	1	5	6	0	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	1	1	0	59	3	2	64
		15	L2			UP	TD		30	0	2	3	4	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	44	0	2	46
IAP	Airdrome-bos	3	L2	UP			0	0	75		15	25	9	8	1	6	2	1	14	40	16	0	0	1	2	0	12	13	35	10	7	NR	1	0	142	73	78	293
	Apples	7	L2	UP			0	0	4		0	1	0	0	NR	0	1	0	5	17	14	1	1	4	4	1	8	3	27	6	5	1	2	0	6	47	52	105
		15	L2	UP			0	0	0		0	1	0	0	NR	0	0	0	2	3	0	1	1	1	0	0	1	0	3	0	0	NR	3	1	1	8	8	17
		16	L2	UP			0	0	1		0	3	8	13	NR	16	4	0	17	27	24	0	2	7	1	0	14	11	30	4	2	NR	20	2	45	78	83	206
BIFS	Airdrome	1	L2	UP			1	3	30		6	25	4	7	15	23	0	0	4	0	0	0	1	0	0	0	1	0	12	NR	NR	NR	NR	NR	114	5	13	132
	Big Bosc	11	L2	UP			1	4	24		3	21	5	NR	11	6	0	0	5	0	0	0	0	0	2	1	2	3	9	NR	NR	NR	NR	NR	75	6	14	97
		12	L2	UP			2	1	15		2	10	3	NR	7	13	0	0	0	0	0	0	0	0	0	4	0	0	0	NR	NR	NR	NR	NR	53	4	0	57
	Airdrome	4	L2	UP			0	6	27		5	1	3	3	8	4	4	0	1	0	1	0	1	0	0	3	0	0	0	NR	NR	NR	NR	NR	61	6	0	67
	Small Bosc	5	L2	UP			*0*	1	29		4	9	1	*0*	*10*	*6*	*0*	1	1	0	2	1	*0*	1	1	*0*	*0*	7	*6*	NR	NR	NR	NR	NR	61	6	13	80
		6	L2	UP			0	2	15		2	5	3	3	4	7	1	0	1	0	1	NR	0	0	1	3	1	7	NR	NR	NR	NR	NR	NR	42	6	8	56
	Airdrome	9	L2	UP			0	1	20		14	48	33	NR	6	10	4	0	5	0	6	0	4	6	9	5	6	2	26	NR	NR	NR	NR	NR	136	35	34	205
	Bartletts	13	L2	UP			1	5	17		3	27	11	NR	22	43	0	0	8	1	0	1	2	4	0	4	5	0	5	NR	NR	NR	NR	NR	129	20	10	159
		14	L2	UP			0	0	6		3	1	4	NR	11	15	3	0	1	0	3	0	0	4	2	0	3	1	8	0	0	NR	1	0	43	10	13	66
BIFS	Frog Hollow	1	L2	NU		NU	UP	7		0	4	2	11	NR	4	0	0	2	3	4	0	0	0	1	1	0	0	6	3	1	0	0	0	28	11	10	49
		2	L2	UP		0	4	5		2	5	8	19	13	4	1	0	2	2	1	0	0	1	0	0	0	0	3	2	1	0	0	0	61	6	6	73
		3	L2	*UP*		*0*	3	11		*0*	1	1	*10*	*8*	2	1	3	1	3	*0*	*0*	1	*0*	*0*	*0*	*0*	*0*	1	*0*	*0*	*0*	*0*	*0*	*0*	38	5	1	44
		4	L2	UP		0	1	20		0	4	12	37	26	22	25	19	30	17	30	0	14	2	8	9	0	0	23	18	5	3	0	0	168	110	49	325
		6	L2	UP		0	3	15		0	2	29	17	7	7	0	0	1	1	0	5	0	1	0	0	1	1	2	2	1	4	0	0	80	8	11	99
SUPERCHARGED LURES:																																					
BIFS	Little Kami	3	ML							NU	NU	UP	16	18	7	2	0	0	0	1	3	0	10	0	2	1	2	3	1	1	0	0	0	43	16	8	67
BIFS	Big Kami	18	ML									UP	7	12	4	1	0	1	0	0	0	1	2	1	0	0	0	0	0	1	0	0	0	24	5	1	30
		22	ML									UP	1	8	4	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	13	1	1	15
BIFS	Ghiozzi	7	ML							NU	NU	UP	17	7	0	1	2	3	1	0	0	0	15	5	7	14	6	5	0	1	0	3	0	27	31	29	87
BIFS	Little Grigsby	13	ML							NU	NU	UP	9	3	0	0	1	1	0	2	1	1	9	7	6	11	3	4	0	1	3	0	0	13	27	22	62
BIFS	Big Grigsby	29	ML									UP	8	34	22	4	1	0	0	NR	1	0	10	12	3	4	6	NR	0	0	0	0	0	69	26	10	105
BIFS	Stonebarger	5	ML							NU	NU	UP	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	4	1	0	3	0	0	0	2	10	12
BIFS	Preston III	18	ML									UP	1	1	0	0	0	0	0	0	2	0	2	0	1	0	0	0	1	2	0	0	0	2	5	3	10
		24	ML									UP	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*4*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*7*	*2*	*10*
BIFS	Preston II	2	ML							NU	NU	UP	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
		4	ML							NU	NU	UP	0	0	0	0	0	0	0	0	0	0	2	0	2	2	1	0	0	0	1	0	0	0	4	4	8
BIFS	Preston I	13	ML							NU	NU	UP	1	0	0	1	2	0	0	0	1	4	5	1	4	3	7	1	1	2	4	0	0	4	15	18	37
		16	ML							NU	NU	UP	1	1	0	0	0	0	1	0	0	0	1	1	3	1	0	0	0	0	0	0	0	2	6	1	9
IAP	Airdrome	2	ML							NU	NU	UP	2	11	12	10	0	3	0	6	1	0	5	31	22	30	76	15	NR	NR	NR	NR	NR	35	68	121	224
BIFS		8	ML							NU	NU	UP	NR	0	2	13	3	11	7	15	4	5	12	11	2	13	10	24	0	4	NR	4	0	18	57	55	140
		10	ML							NU	NU	UP	NR	1	8	10	3	0	0	2	0	1	18	20	8	4	34	8	NR	NR	NR	NR	NR	22	49	46	117
BIFS	Frog Hollow	5	ML	NU	NU	NU	NU	UP		5	11	14	14	27	32	23	1	13	5	4	3	12	9	22	2	2	2	13	3	7	2	0	0	127	70	29	226

Table 4B: Wednesday trap counts throughout the 2001 season

Program	Ranch	Trap No.	Lure	3/20	3/21	3/22	3/23	3/27	3/29	4/4	4/11	4/18	4/25	5/2	5/9	5/16	5/24	5/30	6/6	6/12	6/21	6/27	7/4	7/11	7/17	7/24	8/1	8/8	8/14	8/22	8/28	9/5	9/12	9/19	CUM BF1	CUM BF2	CUM BF3	SEASON TOTAL
REGULAR 1X LURES																																							
IAP3	Jacuzzi FI	18	L2	UP		0			0	3	0	2	4	0	0	0	0	0	0	6	9	1	2	0	0	0	0	1	8	4	0	0	0	0	9	16	13	40
		19	L2	UP		0			0	4	1	0	3	1	0	0	0	0	2	31	28	15	12	26	3	37	13	65	48	11	23	17	36	13	9	154	226	389
		20	L2	UP		0			0	12	0	1	0	4	2	0	1	0	6	37	27	18	22	19	7	24	39	33	41	37	16	14	39	10	20	160	229	409
		21	L2	UP		0			0	0	0	0	0	0	0	0	0	0	0	6	22	6	4	8	0	14	17	17	16	16	10	5	6	1	0	60	88	148
		23	L2	UP		0			0	4	1	0	0	0	0	0	0	0	0	0	5	0	8	3	0	3	13	8	24	13	6	2	5	3	5	19	74	98
		24	L2	UP		0			1	4	4	4	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	2	2	1	0	0	0	13	6	5	24
		25	L2	UP		0			0	3	0	0	0	0	0	0	0	0	0	1	2	0	1	1	0	0	1	0	0	0	0	0	0	0	3	5	1	9
		28	L2	UP		0			0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	5	0	2	7
IAP3	Rosie Flat	26	L2	UP		0			0	3	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	3	0	0	0	0	4	3	3	10
		29	L2	UP		0			0	3	0	4	0	0	0	0	0	0	0	3	14	0	2	0	0	0	0	0	2	4	1	2	0	0	7	19	9	35
		30	L2	UP		0			1	14	1	3	0	1	0	0	0	0	1	12	0	0	0	0	0	0	0	0	5	8	2	0	0	0	20	13	15	48
		32	L2	UP		0			0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	2	4
		33	L2	UP		0			0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	1	1	2	4
		34	L2	UP		0			0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	4	0	0	0	0	2	1	5	8
		35	L2	UP		0			1	2	0	0	0	0	0	0	0	0	0	4	8	0	1	0	0	0	0	0	0	12	0	0	0	0	3	13	12	28
IAP3	Nerdy	1	L2	UP					0	1	0	0	0	0	NR	0	0	0	2	1	1	1	0	0	0	0	NR	0	1	0	2	0	0	0	1	5	3	9
		2	L2	UP					1	0	1	2	1	1	NR	1	1	0	2	7	NR	1	8	3	0	0	NR	2	2	1	2	1	2	0	8	21	10	39
		3	L2	UP					0	0	0	1	0	0	NR	2	0	0	0	1	NR	0	0	0	1	0	NR	0	1	0	0	0	0	0	3	2	1	6
		4	L2	UP					2	0	1	3	0	0	NR	2	0	0	1	0	NR	2	0	1	1	1	NR	4	2	0	1	0	0	0	8	6	7	21
		5	L2	UP					1	7	0	4	2	0	NR	4	0	0	1	0	NR	2	1	0	0	0	NR	1	0	2	3	0	0	0	18	4	6	28
		7	L2	UP					1	3	3	6	0	0	NR	1	0	0	1	1	NR	2	0	1	0	0	0	0	2	0	1	0	0	0	14	5	3	22
		8	L2	UP					0	1	0	0	0	0	NR	0	1	0	0	0	NR	0	0	0	0	0	0	0	1	0	2	0	0	0	2	0	3	5
		9	L2	UP					0	1	0	5	0	0	NR	0	0	0	0	0	NR	0	0	0	0	0	NR	0	2	1	0	0	0	0	6	0	3	9
MD4	Delta Roa	1	L2		UP		0		0	4	1	3	1	0	1	0	0	0	0	1	0	0	0	2	0	1	0	1	0	0	1	0	0	0	10	4	2	16
		3	L2		UP		0		2	16	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	21	0	3	24
		5	L2		UP		0		1	18	8	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	36	0	2	38
		6	L2		UP		0		1	2	1	0	0	0	TM	6	0	0	0	2	1	1	0	0	1	0	0	0	0	4	2	1	0	0	10	5	7	22
		7	L2		UP		0		2	2	1	1	0	0	0	0	2	0	1	2	0	2	2	0	0	0	0	0	0	0	1	0	0	0	8	7	1	16
		8	L2		UP		0		1	8	2	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2	0	0	11	2	2	15
IAP3	Eden Plai	1	L2		UP		0	0		16	2	2	3	1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	6	22	1	3	0	0	25	2	32	59
		3	L2		UP		0	1		4	0	1	4	0	3	0	0	0	2	0	4	1	0	2	0	0	0	1	24	25	28	6	0	0	13	9	84	106
		4	L2		UP		0	0		1	0	0	0	4	0	0	1	0	0	0	1	0	0	0	0	0	0	1	10	6	3	0	1	0	6	1	21	28
IAP3	Lopez	1	L2		UP		0		0	1	2	3	0	0	7	12	0	0	0	0	0	2	1	1	0	0	0	0	0	0	2	0	0	0	25	4	2	31
		12	L2		UP		0		0	3	5	2	2	2	1	23	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	38	5	0	43
IAP3	Chavez	3	L2		UP		0		0	7	0	0	0	1	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	9	3	1	13
		11	L2		UP		0		1	4	0	1	2	1	1	5	0	0	1	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	15	3	2	20
IAP2	Little Garr	10	L2		UP		0		2	11	0	5	1	5	7	8	2	0	1	1	1	1	1	0	2	0	0	0	1	2	2	0	0	0	41	7	5	53
BIFS2	Geddes	5	L2		UP		0		0	2	1	2	2	0	1	7	1	0	4	0	3	1	7	9	3	0	1	3	11	14	6	4	1	0	16	27	40	83
		7	L2		UP		0		1	9	0	0	4	18	16	85	36	16	24	0	4	4	1	2	0	1	0	2	15	4	3	1	1	0	185	36	26	247
		8	L2		UP		0		0	7	1	0	3	1	2	14	4	0	3	2	2	1	2	3	0	0	0	1	11	9	5	1	0	0	32	13	27	72
		9	L2		UP		0		1	13	1	7	5	28	49	62	51	21	21	3	24	4	5	23	6	0	0	0	22	18	8	12	0	0	238	86	60	384
SUPERCHARGED LURES:																																						
#REF!	Jacuzzi FI	22	ML								NU	NU	UP	1	0	0	0	0	0	4	4	0	0	0	0	0	2	0	1	1	0	0	0	0	1	8	4	13
		27	ML								NU	NU	UP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#REF!	Rosie Flat	31	ML								NU	NU	UP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1
#REF!	Nerdy	6	ML								NU	NU	UP	6	NR	5	2	0	0	2	NR	5	4	24	8	6	19	11	17	8	8	1	1	0	13	49	63	125
		10	ML								NU	NU	UP	1	NR	2	0	0	0	0	NR	0	0	12	0	0	NR	4	2	3	4	0	2	1	3	12	16	31
#REF!	Delta Roa	2	ML								NU	NU	UP	2	16	9	0	2	0	0	0	3	2	10	3	3	4	2	5	9	5	5	0	0	29	21	30	80
		4	ML								NU	NU	UP	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
#REF!	Eden Plai	2	ML								NU	NU	UP	6	3	0	0	0	2	0	0	0	0	1	0	0	0	0	7	7	7	0	1	0	9	3	22	34
#REF!	Chavez	2	ML								NU	NU	UP	1	5	8	2	1	4	0	2	2	7	27	16	6	3	0	1	2	1	0	0	0	17	64	7	88
#REF!	Little Garr	4	ML								NU	NU	UP	5	3	16	11	6	0	0	3	4	2	9	15	1	7	0	2	8	0	4	0	0	41	34	21	96
#REF!	Geddes	6	ML								NU	NU	UP	1	9	24	8	2	0	0	2	0	1	25	29	10	14	8	6	6	6	2	0	0	44	67	42	153

NU=not up
NR=not recorded
TD=trap down
TM=trap missing

Table 5: Codling moth damage in the IAP,BIFS and comparison orchards

Program	Orchard	Acres	CM Control	CODLING MOTH DAMAGE 1st Gen	2nd Gen	3rd Gen	TOTAL
IAP3	Jacuzzi Flat	35	Isomate	0.0	7.1	1.3	8.4
IAP3	Rosie Flat	28	Isomate	0.0	0.2	0.1	0.3
IAP3	Neroly	42	Isomate	0.1	0.5	0.5	1.1
IAP3	Eden Plains	13	Isomate	0.1	4.0	6.7	10.8
IAP3	Lopez Garrels	7	Puffers	4.2	8.0	7.8	20.0
IAP3	Chavez Garrels	7	Puffers	0.5	6.8	5.7	13.0
IAP3	Little Garrels	8	Puffers	5.8	14.0	0.0	19.0
IAP3	Airdrome: Apples	24	checkmate	0.5	1.0	2.6	4.1
IAP AVERAGE DAMAGE				1.4	5.2	3.1	9.6
BIFS2	Geddes	20	Puffers	23.4	20.7	0.0	35.0
BIFS2	Little Kami	22	Puffers	4.4	6.6	0.0	11.0
BIFS1	Big Kami	50	Puffers	3.9	3.1	8.0	15.0
BIFS2	Little Grigsby	20	Puffers	2.2	3.4	1.1	6.7
BIFS1	Big Grigsby	23	Puffers	20.2	11.8	0.0	25.0
BIFS2	Ghiozzi	19	Puffers	1.2	2.4	2.4	5.4
BIFS2	Stonebarger	10	Isomate	0.0	0.0	1.0	1.0
BIFS2	Preston I	42	Puffers	0.6	1.0	0.9	2.5
BIFS2	Preston II	45	Puffers	0.7	0.6	1.7	3.0
BIFS1	Preston III	38	Puffers	0.1	0.3	0.1	0.5
BIFS2	Airdrome: Bartletts	40	Checkmate	0.1	2.6		2.7
BIFS2	Airdrome: Bosc	29	Checkmate	0.0	0.1		0.1
BIFS2	Frog Hollow	63	Checkmate-Organic 2	1.8	2.3	5.9	10.0
BIFS AVERAGE DAMAGE				4.5	4.2	1.9	9.1
MD4	Delta Rd	16	Isomate	0.1	0.3	2.9	3.3
MD COMPARISON AVERAGE DAMAGE				0.1	0.3	2.9	3.3

NOTE: 1st generation counts taken 6/1 - 6/20 (961-1363 DD)
2nd generation counts taken 7/19- 8/3 (1039-1344 DD)
3rd generation/pre-harvest counts taken 8/23 - 9/26 (650-1332DD)

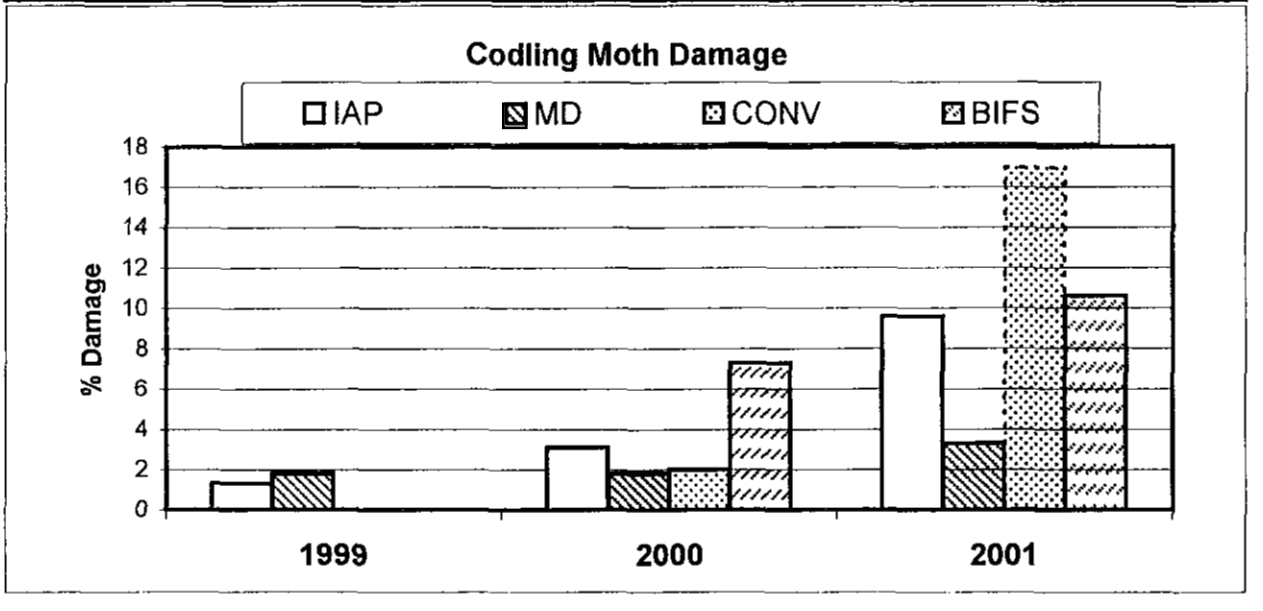

Table 6A: BIFS - Preston orchards (Block 1) plus Stonebarger Orchard

ORCHARD	CM FLIGHT No.	Date	TRAP ACTIVITY	OPTIMUM SPRAY TIMING	ACTUAL TREATMENT MD	Spray	% CM DAMAGE by flight	by gen	survey	NOTES
	all	2000						**0.1**		very low pressure
Preston 1 BIFS 2	1a	3/27	Moderate	4/25	none	4/26 Sevin 4/29 Imidan edge	0.2			weak material and partial spray allowed escapes; no MD up yet
	1b	5/15	Lo-Moderate	5/28	5/25 Paramount	none	0.4	0.6	6/13	light trap counts - opted for no spray
	2a	6/5?	Lo-Moderate	6/17	"	none	0.4			light trap counts - opted for no spray
	2b	7/3	Low	(7/21)	"	none	0.6	1.0	7/19	no2B spray due to harvest
	3a	7/23	none	(8/4)	"	8/1 Imidan-W half				partial spray allowed some escapes
	3b	8/13	Lo-Moderate	8/26	"	none		0.9	9/6	no 3B spray due to harvest
	TOTAL							**2.5**		
	all	2000						**0.0**		very low pressure
Preston 2 BIFS 2	1a	3/27	Moderate	4/25	none	4/26 Sevin 4/29 Imidan edge	0.3			weak material and partial spray allowed escapes; no MD up yet
	1b	5/15	Lo-Moderate	(5/28)	5/25 Paramount	none	0.4	0.7	6/13	light trap counts - opted for no spray
	2a	6/5	Lo-Moderate	(6/17)	"	none	0.0			light trap counts - opted for no spray
	2b	7/3	Moderate	7/14	"	none	0.6	0.6	7/25	no2B spray due to harvest
	3a	7/27	Moderate	8/6	"	none				missed spray
	3b	8/13	Moderate	8/24	"	none		1.7	8/31	no 3B spray due to harvest
	TOTAL							**3.0**		
	all	2000						**0.0**		very low pressure
Preston 3 BIFS 1	1a	3/29	Lo-Moderate?	4/25	none	4/12 & 4/26 Sevin 4/29 Imidan edge	0.1			weak material and partial spray allowed escapes; no MD up yet
	1b	5/16	Lo-Moderate	(5/28)	5/25 Paramount	none	0.0	0.1	6/13	light trap counts - opted for no spray
	2a	6/6	none	(6/17)	"	none	0.1			no trap counts - no need to spray
	2b	7/10	Lo-Moderate	(7/21)	"	none	0.2	0.3	7/25	light trap counts - opted for no spray
	3a	7/23	Low	(8/4)	"	none				light trap counts - opted for no spray
	3b	8/14	none	(8/24)	"	none		0.1	8/23	no trap counts - no need to spray
	TOTAL							**0.5**		
	all	2000						**0.0**		very low pressure
Stonebarger BIFS 2	1a	4/17	Low	(5/6)	4/6 Isomate	4/28 Imidan	0.0			
	1b	?	none		"	none	0.0	0.0		
	2a	6/11?	Low	(6/21)	"	none	0.0			
	2b	7/3	Low	(7/14)	"	none	0.0	0.0		
	3a	?	none		"	none				
	3b	8/13	High	(8/24)	?	none		1.0		MD ran out - no sprays
	TOTAL							**1.0**		

Trap Activity Guidelines:	Low = infrequent single moth catches during a flight, not consecutive Moderate = 3-5 moths/trap/flight (single catch or consecutive) High = more than 5 moths/trap/flight and consecutive catches

Table 6B: BIFS - Kami/Grigsby orchards (Block 2)

ORCHARD	CM FLIGHT No.	CM FLIGHT Date	TRAP ACTIVITY	OPTIMUM SPRAY	TIMING MD	TIMING Spray	% CM DAMAGE by flight	% CM DAMAGE by gen	% CM DAMAGE survey	NOTES
	all	2000						**3.5**		population from last season
Little Kami	1a	3/27	High	4/25	none	4/6 & 4/29 Sevin	0.8			weak material - MD not up yet
BIFS 2	1b	5/15	High	5/26	5/10 Paramount	6/2 Guthion	2.9	4.0	6/14	OK timing - poor spray performance
	2a	6/5	High	6/17	"	none	~4.0			no 2A spray
	2b	7/3?	High	7/15	"	7/12 Imidan	2.6	6.6	8/3	good timing - short residual for harvest
	3a	7/25?	Moderate	8/7	"	8/4 Guthion				EXCELLENT CONTROL!
	3b	8/13	High	8/25	"	none		0.0	8/29	harvested before 3B hatch
	TOTAL							**11.0**		
	all	2000						**0.5**		minor population last season
Little Grigsby	1a	3/27	High	4/25	none	4/6 & 4/29 Sevin	0.6			weak material - MD not up yet
BIFS 2	1b	5/15	Moderate	5/26	5/10 Paramount	6/1 Guthion	1.3	2.2	6/14	OK timing - poor spray performance
	2a	6/5	High	6/17	"	none	~2.7			no 2A spray
	2b	7/3?	Moderate	7/15	"	7/12 Imidan	0.7	3.4	7/19	good timing - short residual for harvest
	3a	7/25?	Low	(8/4)	"	8/4 Guthion				good timing
	3b	8/13	High	8/25	"	none		1.1	8/29	no 3B spray due to harvest
	TOTAL							**6.7**		
	all	2000						**2.7**		population from last season
Big Kami	1a	3/27?	High	4/25	none	4/28 Guthion	0.6			good timing - poor spray performance
BIFS1	1b	5/15	High	5/25	5/12 Paramount		2.8	3.9	6/13	no 2A spray
	2a	6/5	Low	(6/17)	"	6/17 Guthion	`1.8?			good timing - poor spray performance
	2b	7/10	Moderate	7/21	"		1.4	3.1	7/25	late for 2B - results in 1/2 of 2A stings?
	3a	7/23	Moderate	8/4	"	7/29 Guthion				early for 3A - doesn't cover whole flight
	3b	8/13	Low	(8/25)	"	none		8.0	8/29	no 3B spray due to harvest
	TOTAL							**15.0**		
	all	2000						**?**		
Big Grigsby	1a	3/27?	High	4/25	none	5/1 Guthion	1.6			a little late - no MD yet
BIFS 1	1b	5/15	High	5/25	5/15 Paramount		13.6	20.2	6/13	missed spray due to irigation
	2a	6/5	Moderate	6/17	"	6/13 Guthion	`9.7			Poor spray performance!
	2b	7/10	High	7/21	"	7/16 Guthion	2.1	11.8	7/25	Poor spray performance!
	3a	7/23	Moderate	8/4	"	8/9 Imidan				EXCELLENT CONTROL!
	3b	8/13	Low	(8/25)	"	none		0.0	9/6	
	TOTAL							**25.0**		
	all	2000						**6.3**		high popn last season
Ghiozzi	1a	3/27	High	4/25	none	4/29 Sevin & Imidan	0.9			Short residual material - no MD up
BIFS 2	1b	5/15	Lo-Mod	5/25	5/10 Paramount	6/2 Guthion	0.3	1.2	6/14	better control - lower trap counts
	2a	6/5	High	6/17	"	none	1			missed spray
	2b	7/4	High	7/15	"	7/12 Imidan	0.8	2.4	7/19	short residual material for harvest
	3a	7/23?	none	(8/4)	"	8/4 Guthion				
	3b	8/13	High	8/25	"	9/18 Imidan		2.4	9/26	3B late due to harvest
	TOTAL							**5.4**		

Trap Activity Guidelines:	Low = infrequent single moth catches during a flight, not consecutive Moderate = 3-5 moths/trap/flight (single catch or consecutive) High = more than 5 moths/trap/flight and consecutive catches

Table 6C: BIFS and IAP - Garrells-Geddes orchards (Block 3)

ORCHARD	CM FLIGHT No.	CM FLIGHT Date	TRAP ACTIVITY	OPTIMUM SPRAY TIMING	ACTUAL TREATMENT MD	ACTUAL TREATMENT Spray	% CM DAMAGE by flight	% CM DAMAGE by gen	% CM DAMAGE survey	NOTES
	all	2000						**5.9**		population from last season
Geddes BIFS 2	1a	3/27	High	4/25	none	5/2 Sevin & Imidan	3.4			weak material - poor spray performance - no MD up yet
	1b	5/15	High	5/28	5/20 Paramount	6/1 Guthion	14.0	23.4	6/15	OK timing - poor spray performance
	2a	6/5	High	6/17	"	none	~12.0			missed spray
	2b	7/11	High	7/21	"	7/16 Imidan	8.7	20.7	7/20	early timing - residual too short
	3a	7/25?	Moderate	8/4	"	7/31 Guthion				EXCELLENT CONTROL!
	3b	8/14	High	8/26	"	none		0.0	8/31	early harvest before 3B damage
	TOTAL							**35.0**		fly ins from Packing House or walnuts?
	all	2000						**8.4**		population from last season
Little Garrells IAP 3	1a	3/27	High	4/25	none	5/2 Imidan	2.3			a little late - short residue material
	1b	5/15	High	5/26	5/20 Paramount	6/1 Imidan	3.1	5.8	6/20	a little late - short residue material
	2a	6/5	Moderate	6/17	"	none	6.9			missed spray
	2b	7/4?	Low	(7/21)	"	7/14 Guthion	7.1	14.0	7/20	a little early - poor spray performance
	3a	7/25?	none	(8/4)	"	8/6 Guthion				good timing - EXCELLENT CONTROL!
	3b	8/14	Moderate	8/26	"	9/18 Imidan		0.0	9/20	
	TOTAL							**19.0**		
	all	2000						**5.2**		population from last season
Chavez Garrells IAP 3	1a	3/29	Moderate	4/25	none	4/15 Sevin & 5/2 Imidan	0.0			
	1b	5/16	Moderate	5/26	5/20 Paramount	6/1 Imidan border	0.5	0.5	6/20	partial spray didn't control
	2a	6/6	Lo-Mod	(6/17)	"		1.4			light trap counts - opted for no spray
	2b	7/4	Lo-Mod	(7/21)	"	none	5.4	6.8	7/20	light trap counts - opted for no spray
	3a	7/23?	none	(8/4)	"	8/9 Imidan				no trap counts - used short residue
	3b	8/14	Lo-Mod	(8/26)	"	none		5.7	9/6	light trap counts - opted for no spray
	TOTAL							**13.0**		
	all	2000						**5.4**		population from last season
Lopez Garrells IAP 3	1a	3/27?	High	4/25	none	4/15 Sevin & 4/26 Imidan	1.0			good timing - poor control - no MD yet
	1b	5/15	High	5/26	5/20 Paramount	6/1 Imidan border	2.3	4.2	6/20	needed full spray but wet
	2a	6/5	Moderate	6/17	"		2.0			missed spray
	2b	7/4	Lo-Mod	(7/21)	"	none	6.0	8.0	7/20	No spray - Lo traps and harvesting
	3a	7/23	none	(8/4)	"	8/9 Imidan				good timing - poor spray performance
	3b	8/13	Lo-Mod	(8/26)	"	none		7.8	9/6	No spray - Lo traps and harvesting
	TOTAL							**20.0**		

Trap Activity Guidelines:	Low = infrequent single moth catches during a flight, not consecutive Moderate = 3-5moths/trap/flight (single catch or consecutive) High = more than 5 moths/trap/flight and consecutive catches

Table 6D: BIFS - Airdrome orchards (Block 4) and Frog Hollow organic orchard

ORCHARD	CM FLIGHT No.	CM FLIGHT Date	TRAP ACTIVITY	OPTIMUM SPRAY TIMING	ACTUAL TREATMENT MD	ACTUAL TREATMENT Spray	% CM DAMAGE by flight	% CM DAMAGE by gen	% CM DAMAGE survey	NOTES
	all	2000						**4.2**		existing popn in apples and adjacent pears
Airdrome -	1a	4/3	High	5/3	5/15 Checkmate	4/27 Guthion	0.3			good timing - late MD application
Apples	1b	5/15	High	5/27	"	none	0.1	0.5	6/20	missed spray
IAP 3	2a	6/5	V. High	6/17	"	6/23 Guthion	0.5			a little late
	2b	7/3	High	7/16	?	none	0.5	1.0	7/20	couldn't spray due to harvest
	3a	7/31	High	8/11	none	none				missed 3A spray
	3b	8/13	V. High	8/25	none	8/24 Imidan		2.6	9/13	Excellent timing for 3B
	TOTAL							**4.1**		need season long control in adjacent pears!
	all	2000						**0**		popn built up after harvest
Airdrome -	1a	3/23	High	4/23	5/15 Checkmate	4/24 Guthion	0.0			good timing (late MD OK for bosc)
Bosc	1b	5/8	High	5/27	"	none	0.0		6/14	Guthion residual covered hi flight period
BIFS 2	2a	6/5	Moderate	(6/17)	"	none	0.0			opted for no spray - less susc variety
	2b	7/3	Lo-Mod	(7/15)	"		0.1	0.1	7/20	opted for no spray - harvest 7/20
	3a	7/23	Moderate		none					
	3b	8/13	NR		none			0.1		
	TOTAL							**4.1**		less susc to CM than apples or bartletts
	all	2000						**0.1**		popn built up after harvest
Airdrome -	1a	3/23	High	4/25	5/1 Checkmate	4/24 Guthion	0.1			good timing - late MD application
Bartlett	1b	5/8	High	5/27	"	none	0	0.1	6/20	missed spray
BIFS 2	2a	6/5	High	6/17	"	none	1.1			missed spray
	2b	7/3	High	7/15	?		1.5	2.6	7/16	couldn't spray - harvesting 7/16
	3a	7/23	High		none					
	3b	8/13	NR		none					
	TOTAL							**2.7**		high pressure near apples & more susc var
	all	6/22						**54.0**		V.high popn from last season
Frog Hollow	1a	3/27	V. High	4/16	3/19 Isomate	4/18 oil	0.1			less oil during rain due to sulfur & lo mating
BIFS 2	1b	5/1	V. High	5/9+	"	5/8,5/12,5/19,5/28,6/1 oil	1.5	1.8	6/1	CM damaged fruit removed early June
(organic)	2a	6/5	V. High	6/12+	"	6/9,6/16,6/23,6/30 oil	0.2			
	2b	7/3	High	7/9+	6/16 Isomate	7/5,7/10,7/21,7/26 oil	2.1	2.3	7/19	CM damaged fruit removed mid July
	3a	7/23	High	7/31+	"	8/1,8/11,8/18 oil				
	3b	8/13	High	8/21+	"	8/24, 9/1, 9/8 oil		5.9	9/13	CM damaged fruit removed early Sept
	TOTAL							**10.0**		excellent popn decrease with soft tools

Trap Activity Guidelines:	Low = infrequent single moth catches during a flight, not consecutive Moderate = 3-5or 6 moths/trap/flight (single catch or consecutive) High = more than 5 moths/trap/flight and consecutive catches

Table 6E: IAP - Rosie/Jacuzzi/Neroly (Block 5) and Eden Plains Orchard

ORCHARD	CM FLIGHT No.	CM FLIGHT Date	TRAP ACTIVITY	OPTIMUM SPRAY TIMING	ACTUAL TREATMENT MD	ACTUAL TREATMENT Spray	% CM DAMAGE by flight	% CM DAMAGE by gen	% CM DAMAGE survey	NOTES
	all	2000						**0.1**		very low pressure
Jacuzzi Flats IAP 3	1a	3/29	High	4/25	4/1 Isomate	5/1 Imidan & Sevin	0			
	1b	5/16	Low	(5/28)	"	none	0	0	6/15	
	2a	6/6	High	6/17	"	6/21 Guthion edge	4.5			migration from organic block
	2b	7/10	High	7/21	7/7 Isomate	none	2.6	7.1	7/26	migration from organic block
	3a	7/23	High	8/4	"	8/3 Guthion				good timing and effectiveness
	3b	8/14	High	8/24	"			1.3	9/6	no 3B spray due to harvest
	TOTAL							**8.4**		damage in W block only (near organic)
	all	2000						**0**		very low pressure
Rosie Flats IAP 3	1a	3/29	Moderate	4/25	4/1 Isomate	4/30 Imidan & Sevin	0.0			
	1b	5/15	none	(5/26)	"	none	0.0	0.0	6/15	
	2a	6/5	High	6/17	"	6/21 Guthion edge	0.0			
	2b	7/4	Low	(7/15)	7/7 Isomate	none	0.2	0.2	7/26	migration from organic block
	3a	7/23	Low	(8/4)	"	8/3 Guthion				
	3b	8/13	High	8/26	"	none		0.1	9/6	no 3B spray due to harvest
	TOTAL							**0.3**		
	all	2000						**0.3**		low pressure
Neroly IAP 3	1a	3/27	High	4/25	4/1 Isomate	5/1 Guthion & Diazinon	0			
	1b	5/15	Moderate	5/28	"	none	0.1	0.1	6/15	lighter trap counts - opted for no spray
	2a	6/5	Moderate	6/17	"	none	0.3			lighter trap counts - opted for no spray
	2b	7/4	Moderate	7/15	"	none	0.2	0.5	8/3	lighter trap counts - opted for no spray
	3a	7/23	Moderate	8/4	"	8/8 Guthion				a little late but OK with light pressure
	3b	8/13	Moderate	8/24	none	none		0.5	8/29	
	TOTAL							**1.1**		occasional damage in S. half of block
	all	6/22						**1.5**		small existing popn - W 3 acres abandoned
Eden Plains IAP 3	1a	3/27	High	4/25	4/25 Isomate	4/12 Sevin & 4/28 Imidan	0.1			short residual material - late MD
	1b	5/16	Low	(5/29)	"	none	0	0.1	6/14	lighter trap counts - opted for no spray
	2a	6/6	Moderate	6/18	"	none	1.7			lighter trap counts - opted for no spray
	2b	7/11	Lo-Mod	(7/22)	7/27 Isomate	none	2.3	4	7/25	lighter trap counts - opted for no spray
	3a	7/24?	none	(8/5)	"	8/8 Imidan	6.7		9/6	lighter trap counts - opted for no spray
	3b	8/15	Very High	8/26	"	9/9 Imidan		15.2	10/4	late timing, high pressure, late harvest
	TOTAL							**26**		high pressure from abandoned block

Trap Activity Guidelines:	Low = infrequent single moth catches during a flight, not consecutive Moderate = 3-5or 6 moths/trap/flight (single catch or consecutive) High = more than 5 moths/trap/flight and consecutive catches

Table 7: The incidence of secondary foliar pests and beneficial insects

APPLE PESTS & BENEFICIALS							
		Mite		Leaf Hopper		Leaf Miner	
Program	Orchard	% Leaves w/ Mites	% Biological Control	% Leaves w/ Damage	Severity Rating	Ave # Mines/ Leaf	% Tent / Sap Mines
BIFS2	Geddes	5	0	2	1.0	1.49	79 / 21
BIFS2	Little Kami	0	0	0	0.0	1.88	68 / 32
BIFS1	Big Kami	2	0	4	1.3	2.23	66 / 34
BIFS2	Little Grigsby	4	0	0	0.0	3.09	56 / 44
BIFS1	Big Grigsby	30	11	10	1.3	4.06	54 / 46
BIFS2	Ghiozzi	0	0	5	1.0	1.03	49 / 51
BIFS2	Stonebarger	0	0	0	0.0	0.53	41 / 59
BIFS2	Preston I	20	0	0	0.0	0.11	64 / 36
BIFS2	Preston II	3	0	3	1.0	0.34	56 / 44
BIFS1	Preston III	4	0	0	0.0	0.61	62 / 38
BIFS2	Airdrome	0	0	0	0.0	0.58	78 / 22
BIFS2	Frog Hollow	0.5	0	8	1.2	0.15	52 / 48
IAP3	Jacuzzi Flat	0	0	0	0.0	2.71	88 / 12
IAP3	Rosie Flat	0	0	0	0.0	3.34	83 / 17
IAP3	Neroly	2	0	4	1.3	1.73	68 / 32
IAP3	Eden Plains	0	1	25	1.4	0.7	63 / 37
IAP3	Lopez Garrels	2	0	0	0.0	0.66	42 / 58
IAP3	Chavez Garrels	0	0	2	1.0	0.94	56 / 44
IAP3	Little Garrels	1	0	0	0.0	2.61	73 / 27
MD4	Delta Rd	1	0	11	1.1	0.5	62 / 38

NOTES: Evaluations made on 100 basal shoots per orchard on 8/2-8/24
Biological Control = % of infested leaves showing predation
Severity Rating: 0=none 1=mild 2=moderate 3=severe

Table 8: The percent fruit damage other than codling moth

Program	ORCHARD	SCAB	LEAF-ROLLER	THRIP	TRUE BUG	BLISTER MITE	SAN JOSE SCALE	PHYSICAL	SUNBURN
BIFS2	Geddes								
BIFS2	Little Kami	5.6	0.5	0.3		0.1			
BIFS1	Big Kami	3.6	0.2	0.1	0.3	0.1			0.2
BIFS2	Little Grigsby	3.8	0.8	0.2		0.4			0.4
BIFS1	Big Grigsby	1.4		0.1					
BIFS2	Ghiozzi	2.6			0.1				
BIFS2	Stonebarger	2	0.4	0.1			0.4		0.3
BIFS2	Preston I	1.75		0.2	0.2			0.75	
BIFS2	Preston II	2.7	0.2					1.5	
BIFS1	Preston III	7.6		0.6		0.2			
BIFS2	Airdrome: Apples		0.3	0.8					
IAP3	Jacuzzi Flat	0.5	0.2						
IAP3	Rosie Flat	0.2	1.5			0.3			
IAP3	Neroly	0.08	0.08	0.08	0.3				
IAP3	Dwelley's Eden Plains	0.2	0.2		0.3				
IAP3	Lopez Garrels	0.3			0.3				
IAP3	Chavez Garrels								
IAP3	Little Garrels	0.67	0.16						0.5
MD4	Dwelley's Delta Rd	0.1							

Note: *Sample collected 6/1 - 6/20, 1000 fruit per orchard*

Figure 2: Pesticide use and cost

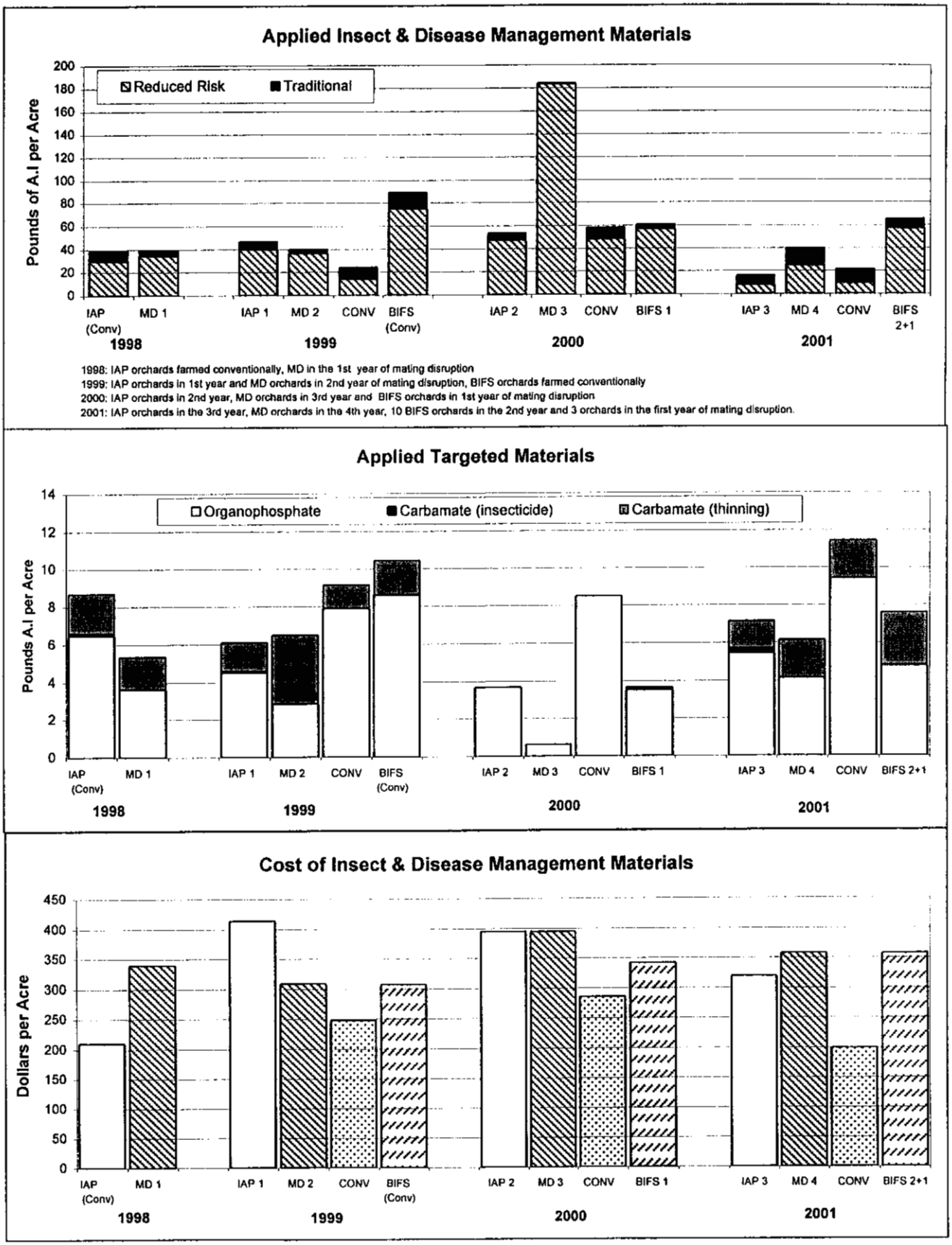

Table 9: IAP outreach efforts over three years

DATE	TYPE	TITLE	FORUM	LOCATION	AUDIENCE	ATTEN-DANCE
June-99	Field Trip	The IAP Porgram	Ag in the Classroom Program	Brentwood	Local Teachers	15
September-99	Field Trip	Apple Pest Systems	Field Entomology & Bio Control Classes	Brentwood	UCB students	24
October-99	Poster	IAP: Meeting the Challenge of the FQPA	CAPCA Conference	Sparks	PCAs	1000+
11/19/99	Workshop	Reduced Risk Apple Production	Annual IAP Workshop	Brentwood	PCAs, growers	50
December-99	Presentation	The IAP Porgram	Private Applicator Update	Brentwood	PCAs, growers	75
January-00	Publication	New Millennium Apple Pest Management	California Grower	statewide circulation	PCAs, growers	?
2/22/00	Presentation	Alternative Codling Moth Control Strategies	Ca. Apple Symposium	Stockton	PCAs, growers	175
March-00	Publication	IAP: Meeting the Challenge of the FQPA	Tree Fruit Magazine	statewide circulation	PCAs, growers	?
3/23/00	Presentation	Integrated Apple Production	Pomology Extension Continuing Conference	UC Davis	scientists	60
June-00	Field Trip	Reduced Risk Pest Management Efforts in CCC	Ag in the Classroom Program	Brentwood	Local Teachers	18
July-00	Field Tour	New Mating Disruption Tools	UC Apple Workgroup Tour	Brentwood	Farm Advisors	15
October-00	Poster	Aerosol Pheromone Dispensers Control CM	CAPCA Conference	Anaheim	PCAs	1000+
December-00	Presentation	Integrated pome Fruit Production Update	Private Applicator Update	Brentwood	PCAs, growers	65
2/27/01	Presentation	Integrated Apple Production Projects in CCC	Ca. Apple Symposium	Stockton	PCAs, growers	84
3/7/01	Presentation	Mating Disruption	"Moth Madness" Apple Growers Meeting	Watsonville	PCAs, growers	29
4/4/01	Presentation	Integrated Apple Production Projects in CCC	UCCE Annual Grower's Meeting	Placerville	PCAs, growers	25
July-01	Publication	IPP Program Gives Softer Pest Control	Tree Fruit Magazine	statewide circulation	PCAs, growers	?
7/27/01	Presentation	Organic Apple & Pear Production in CA	Amer. Society of Horticulture Science Conf.	Sacramento	scientists	60
8/15/01	Field Day	Mating Disruption: Making It Work	Annual IAP/BIFS Workshop	Brentwood	PCAs, growers	20
11/7/01	Presentation	Organic Apple & pear Production in CA	UC Organic Farming Work Group	UC Davis	scientists	60+
December-01	Presentation	Codling Moth Management Update	Private Applicator Update	Brentwood	PCAs, growers	97
1/22/02	Presentation	CM Mating Disruption in Apples	Merced JC - Pest Management Update	Merced	PCAs	120
3/14/02	Presentation	New Develepoments Reduced Risk Apple Productio	"Moth Madness" Apple Growers Meeting	Watsonville	PCAs, growers	?
April-02	Publication	UC IPM Pest Management Guidelines: Apple	UC IPM Pest Management Guidelines	statewide circulation	PCAs, growers	?
	TOTAL					2992+